Volunteer Lake Assessment Program Individual Lake Reports

CRYSTAL LAKE, GILMANTON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	17,627	**Max. Depth (m):**	16.2	**Flushing Rate (yr^{-1}):**	3.8
Surface Area (Ac.):	441	**Mean Depth (m):**	5	**P Retention Coef:**	0.48
Shore Length (m):	7,600	**Volume (m^3):**	8,998,500	**Elevation (ft):**	623

TROPHIC CLASSIFICATION

Year	Trophic class
1989	OLIGOTROPHIC
2003	OLIGOTROPHIC

KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

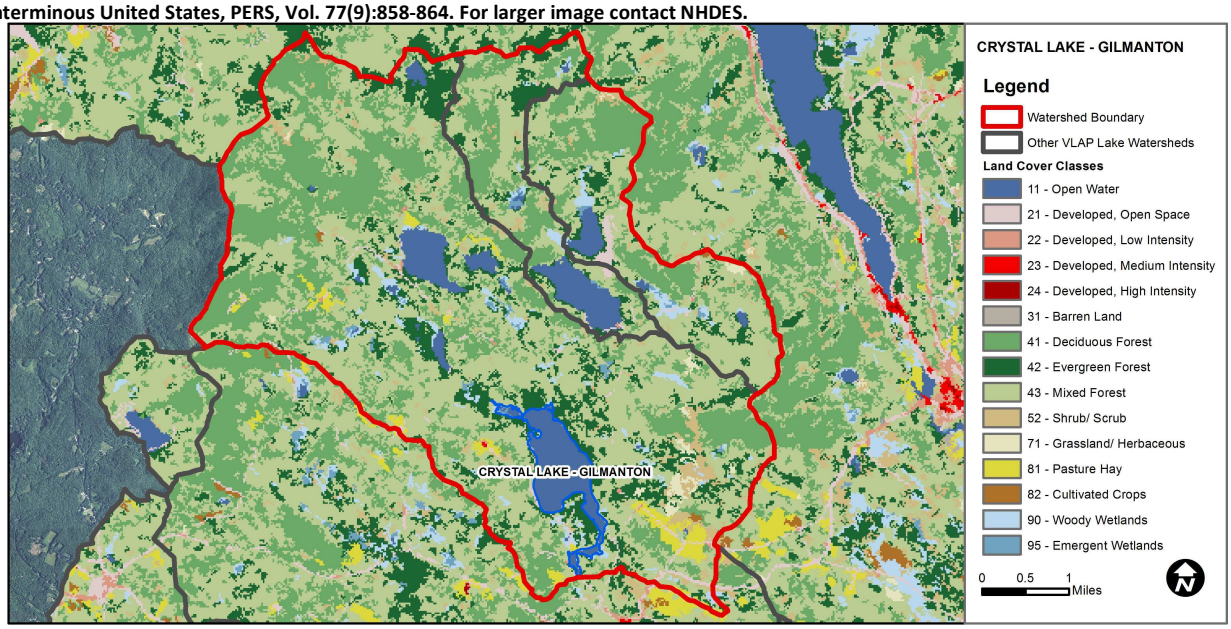
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Slightly Bad	The calculated median is from 5 or more samples and is > indicator and the chlorophyll a indicator is exceeded.
	pH	Bad	>10%, with a minimum of 2, samples exceed criteria, with 1 or more by a large margin.
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Chlorophyll-a	Slightly Bad	The calculated median is from 5 or more samples and is > indicator.
Primary Contact Recreation	Escherichia coli	Encouraging	There are no geometric means or there are > 2 single samples but those samples are within 75% of the geometric means criteria. More data needed.
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

CRYSTAL LAKE-TOWN BEACH	Escherichia coli	Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. One or more exceedance is >2X criteria.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	6.31	Barren Land	0	Grassland/Herbaceous	0.65
Developed-Open Space	1.27	Deciduous Forest	27.82	Pasture Hay	1.57
Developed-Low Intensity	0.13	Evergreen Forest	12.1	Cultivated Crops	0.1
Developed-Medium Intensity	0.01	Mixed Forest	44.52	Woody Wetlands	2.22
Developed-High Intensity	0	Shrub-Scrub	2.8	Emergent Wetlands	0.52

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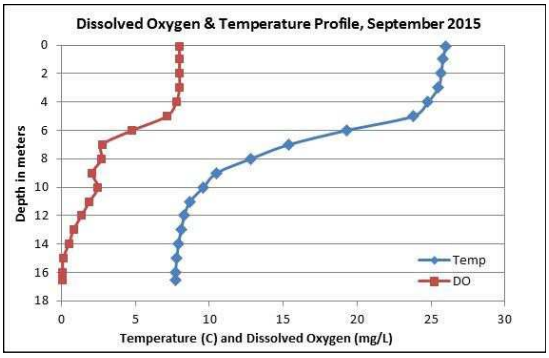
Crystal Lake, Gilmanton

2015 Data Summary

Recommended Actions: The improving and stable water quality trends are a positive sign and we hope to see this continue. The slightly elevated phosphorus and turbidity following significant storm events highlights the importance of minimizing stormwater runoff where possible. Continue to educate and work with watershed residents and the Town to minimize impacts of human activities on the lake and tributaries. Keep up the great work!

Observations (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **Chlorophyll-a:** Chlorophyll levels were relatively stable and low from June to September and were much less than the state median. Historical trend analysis indicates significantly decreasing (improving) chlorophyll levels since monitoring began. We hope to see this continue!
- **Conductivity/Chloride:** Deep spot and tributary conductivity and chloride levels remained stable and low throughout the summer and were equal to or less than the state medians. Historical trend analysis indicates stable epilimnetic (upper water layer) conductivity since monitoring began.
- **Total Phosphorus:** Epilimnetic phosphorus levels remained stable from June to July and then decreased in September and were less than the state median. Historical trend analysis indicates relatively stable epilimnetic phosphorus since monitoring began. Metalimnetic (middle water layer) phosphorus was low in June, increased in July likely due to a layer of algae, and then decreased back to lower levels in September. Hypolimnetic (bottom water layer) phosphorus remained stable and low from June to July and then increased slightly in September. Covered Bridge Bk. phosphorus levels were slightly elevated in June and July following significant storm events, but were low in September. Nats Bridge Bk. phosphorus levels were within the average historical range for that station. The Brook and Wood Bridge Bk. phosphorus levels were elevated in July following a significant storm event. Dry weather conditions prior to these storm events may have resulted in the accumulation of nutrients in stagnant waters that were then flushed through the tributary system during and after the storm.
- **Transparency:** Transparency improved from June to September and was over 6.5 meters in September which is the best transparency on record. Historical trend analysis indicates stable transparency since monitoring began.
- **Turbidity:** Epilimnetic turbidity was stable and low on each sampling event. Metalimnetic turbidity was low in June and July and then increased in September likely due to a layer of algae. Hypolimnetic turbidity was low in June and July and slightly elevated in September likely due to the accumulation of organic compounds when dissolved oxygen levels decrease below 1.0 mg/L. Covered Bridge Bk. and Wood Bridge Bk. experienced elevated turbidities in July following a significant storm event which likely contributed to the elevated phosphorus levels. Outlet turbidity was slightly elevated in June likely due to the high levels of pine pollen as noted on the field data sheet.
- **pH:** Epilimnetic pH was within the desirable range 6.5-8.0 units, however metalimnetic and hypolimnetic pH levels were less than desirable. Historical trend analysis indicates significantly decreasing (worsening) epilimnetic pH since monitoring began. However, in recent years, epilimnetic pH appears to be recovering. Tributary pH levels fluctuated below the desirable range on many sampling events.



Station Name	Table 1. 2015 Average Water Quality Data for CRYSTAL LAKE								
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	Total P ug/l	Trans. m		Turb. ntu	pH
						NVS	VS		
Epilimnion	5.7	2.75	4	34.6	8	5.62	5.60	0.83	6.56
Metalimnion				32.1	10			1.11	5.99
Hypolimnion				33.3	10			5.14	5.72
Covered Bridge Brook				32.9	19			0.99	6.51
Nats Bridge Brook (Nelson Brook)				35.2	21			1.61	6.38
Outlet				34.1	12			1.51	6.50
The Brook				21.0	22			0.66	6.37
Wood Bridge Brook				30.4	17			1.31	6.61

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Stable	Trend not significant; data show low variability.	Chlorophyll-a	Improving	Data significantly decreasing.
pH (epilimnion)	Worsening	Data significantly decreasing.	Transparency	Stable	Trend not significant; data show low variability.
			Phosphorus (epilimnion)	Stable	Trend not significant; data moderately variable.